A JOINER

FIELD OF THE INVENTION

The present invention relates to a device for joining furniture components together. In one particular form, the present invention relates to a device for joining together bench tops.

BACKGROUND OF THE INVENTION

Standard joiners for releasably securing together bench tops and other portions of furniture together are well known. They allow for items such as kitchen cabinets or office furniture to be pre-fabricated and then assembled on-site without requiring the use of nails, screws or adhesives. In an illustrative example, two bench top sections can be joined together to form a single bench by first forming respective opposed circular cavities at a short distance from the edge on the underside of the bench top sections. These cavities are typically formed using a router or specialised drill. Channels are then cut from the respective cavities to meet at the joining edge of each of the bench top sections.

To join the sections together a joiner which includes a threaded bolt with two semi-circular cavity engaging members are positioned so that the engaging members are recessed into the circular cavities with the bolt located in the channel. A nut is then screwed onto the bolt and further tightened thereby drawing the cavities together and hence joining the bench tops in abutting relationship. Although this provides a strong clamping force there are a number of disadvantages with joiners of this type. Clearly two hands are required for this operation. The first hand is required to accurately position the joiner ensuring that the engaging members do not rotate on the bolt with respect to each other and that the joiner is held level. The second hand first tightens the nut to finger tightness and then operates a spanner to further tighten the nut. Often there is little room within the cavity to manoeuvre fingers or a spanner. Additionally the bench top sections being joined must be level and this will require a second person to adjust the levels of the bench top sections whilst a

first person is inserting and installing the joiner from underneath the level of the bench.

One attempt to address some of these disadvantages is described in International Application WO 03/035992. This describes a joiner arrangement having at least one engaging member, a screw threaded shaft passing through the engaging member, at least one nut threadably engaging the shaft, a gear member, a pivot locator on the engaging member such that a shaft with a second gear member may engage with the pivot locator while having the second gear member adapted to mesh with the first gear member whereby to facilitate a tightening of the joining arrangement. However, this approach does not substantially address the problems of the prior art. As the engaging members are located on the threaded shaft they are free to rotate implying that once again both hands will be required to both orientate and tighten the joiner. The tightening arrangement also requires a specialised tool that has been adapted to be inserted into the pivot locator and to engage with the first gear member. Clearly, this would be an inconvenience to tradespeople and the home handy-person as this would require an extra piece of specialised equipment be carried in addition to their standard tools. In addition the nut is still free to spin on the shaft before the joint is tightened also resulting in difficulties when initially placing and tightening the joiner.

It is an object of the invention to provide a joiner which is convenient to install. It is another object of the invention to provide a joiner which is of simple construction and its components readily assembled.

SUMMARY OF THE INVENTION

In a first aspect, the present invention provides a joiner for joining a first and second member together in an end to end relationship, said first and second members including a first cavity and a second cavity respectively, said joiner including:

a joiner for joining first and second panel members together in end to end relationship, said first and second panel member including a first cavity and a second cavity respectively, said joiner including;

a first joining element, having a housing which has surfaces defining a first cavity engaging portion to engage with said first cavity of said first member

a second joining element having an elongate shaft slidably supported in a passageway extending through said housing, said shaft terminating at one end thereof in a second cavity engaging portion to engage with said second cavity of said second member, said shaft having a plurality of teeth spaced along the length thereof so as to form a rack portion; and

drive means operable to effect linear sliding movement of said second joining element so as to retract the shaft into said housing, the retraction of the shaft drawing together said cavity engaging portions to thereby shorten the joiner, said drive means including a driven worm gear in mesh with said rack portion, and a worm gear actuator arranged, upon rotation thereof, to drive said driven worm gear, whereby the rotary motion of the worm actuator is translated into linear motion only of the shaft.

The incorporation of a driven worm gear which meshes with the rack portion of the shaft provides a simple and effective means to bring the first and second joining elements together as the shaft is drawn within the housing in a purely linear fashion without requiring rotation of a nut which would typically threadably engage the shaft directly in prior art mechanisms. As the driven worm gear is in meshing engagement with the shaft, the joiner can be set at a spacing close to that required before inserting into the relevant cavities of the members being joined thus making the joining procedure more convenient. Additionally the driven worm gear and rack portion arrangement allows for the easy loosening of the joiner if required.

Preferably, said driven worm gear has a helical thread arranged to have an axis of rotation inclined to said elongate shaft and to engage with said teeth of said shaft. Desirably, the axis is at an angle of approximately 10° to the longitudinal axis of the shaft.

Preferably, said drive means further includes a gear wheel or cog attached to one end of a shaft which also carries said driven worm gear, said gear wheel meshing with said worm gear actuator.

This provides a convenient and compact arrangement which does not add substantially to the size of the housing of the first joining element.

Preferably, said worm drive actuator further includes a drive head, said drive head including a recess to receive a drill bit.

Clearly, use of a standard power drill to both insert and to operate the joiner greatly increases the ease with which the joiner can be both installed and removed. Also use of a standard drill bit head such as a hexagonal shaped screwdriver bit further adds to the ease of installation of the joiner.

According to a second aspect, the present invention provides a joiner for joining a first and second member together in an end to end relationship, said first and second members including a first cavity and a second cavity respectively, said joiner including:

co-acting first and second joining elements, said first joining element having a housing which has surfaces defining a first cavity engaging portion to engage with said first cavity of said first member;

said second joining element having a second cavity engaging portion to engage with said second cavity of said second member and an elongate shaft

extending from said second cavity engaging portion, said shaft slidably locating through an opening in said housing; and

drive means operable to effect linear sliding movement of said shaft for retracting same into said housing so as to draw said first and second cavity engaging portions towards each other to thereby join together said first and second members.

Preferably, said housing includes a through passageway to receive said shaft and wherein a cross-section of said elongate shaft and the shape of said passageway are complementary and arranged to prevent rotation of said first joining element with respect to said second joining element.

Preferably, said elongate shaft has a substantially rectangular cross section and said passageway has a complementary rectangular shape.

BRIEF DESCRIPTION OF THE DRAWINGS

An illustrative embodiment of the present invention will be discussed with reference to the accompanying drawings wherein:

FIGURE 1 is a top front perspective view of a joiner according to an embodiment of the invention for joining together a pair of panels in edge to edge relationship;

FIGURE 2 is a top perspective view of the joiner only illustrated in Figure 1;

FIGURE 3 is an exploded perspective view of the joiner illustrated in Figure 2;

FIGURE 4 is another exploded perspective view of the joiner illustrated in Figure 2;

FIGURE 5 is a top view of the shaft actuating arrangement of the joiner; while

FIGURE 6 is a fragmentary side view (partly sectioned) of the shaft actuating arrangement.

In the following description, like reference characters designate like or corresponding parts throughout the several views of the drawings.

DESCRIPTION OF AN EMBODIMENT

Referring now to the drawings, there is illustrated a joiner 100 comprising relatively movable joining elements 110, 120 for joining bench top sections 200, 300 according to an illustrative embodiment of the present invention. This embodiment has been described in relation to the joining of sections having extended parallel edges but clearly joining other members together which have corresponding edges which can be clamped together are contemplated to be within the scope of the invention. Joining element 120 has an elongate shaft 130 of rectangular cross-section which at one end joins to a semi-circular head 121 which mates with corresponding circular cavity 210 located on the underside of bench top section 200. Clearly, as would be apparent to those skilled in the art, the exact shape of the respective cavities and cavity engaging portions of the joiner are not important as long as they facilitate a clamping force which joins edges 240, 340 of bench top sections 200, 300 together.

In this embodiment the first joining element 120 is integrally moulded of reinforced plastics, e.g. glass reinforced nylon, with the shaft 130 and head 121 forming an overall "Y" shape. The shaft is provided with a plurality of transverse teeth 131 in its planar top face 132 so as to form a rack component extending along the shaft 130.

Joining element 110 includes a housing 112 which is also integrally moulded of a suitable reinforced plastics material, and has a rectangular through passage 111 which is shaped complementary to the rectangular cross section of elongate shaft 130 allowing shaft 130 to slide linearly through opening 111 but additionally preventing rotation of shaft 130 with respect to joining element 110. Housing 112 has a part-circular portion which engages with corresponding cavity 310 of second bench top section 300 in a similar manner to that of semi-circular head 121 with cavity 210.

Referring now to Figures 2 to 5, the shaft actuating mechanism mounted within housing 112 includes tapered worm drive barrel 150 which is inclined to the rack portion of shaft 130. Clearly, a non-tapered worm drive barrel could be used which would be arranged substantially parallel to the rack portion of shaft 130. Worm drive barrel 150 includes a helical thread 151 which meshes with teeth 131 located on elongate shaft 130. Thus rotation of worm drive barrel 150 about its longitudinal axis in a clockwise direction as viewed from the rear will cause the shaft to retract into the housing 112 through passage 111. Shaft 130 is able to travel through housing 112 and exit outwardly through aperture 113 formed in the distal wall of housing 112.

Worm drive barrel 150 is mounted on a shaft 153 which has a co-axial gear wheel or cog 152 adjacent one end thereof. The parts 150, 152, 153 can be integrally moulded as a single component of reinforced plastics material. A worm drive actuator 140 meshes with gear wheel 152 whereby rotation of the actuator 140 will rotate the worm drive barrel 150 by means of the gear wheel 152 to thereby retract or extend the shaft 130 and inturn shorten or lengthen the joiner. The worm drive 140 has a helical thread 141 which has an axis of rotation generally perpendicular to the plane of the rack. In this embodiment, the axis of shaft 153 which carries the worm drive barrel 150 and worm gear wheel 152 is inclined at an angle of approximately 10° to the horizontal.

Worm drive actuator 140 is a moulded plastics component and locates in a bore in the housing 112 and engages with a snap-fit therein. The actuator 140 has a drive head 142 which is hollowed out to receive a standard hexagonal drive bit which would typically be fitted to the chuck of a power drill. In this embodiment the hex bit is received approximately 7 mm into drive head 142 so that joiner 100 can be positioned on the bit and raised to the joining cavities 210, 310 in bench top sections 200, 300. Additionally the drive head 142 utilises a twelve point hexagonal shape recess instead of the standard six point shape and furthermore incorporates an

internal chamfered edge thereby providing easier entry of the hexagonal drive bit into the hexagonal recess. Drive head 142 is constructed from a material which allows suitable flexing of the recess thus allowing the hex bit to rotate within the recess thereby providing a clutch arrangement that prevents overload of the drive means if drill torque is excessive. Clearly, other forms of the drive head recess so that it can receive the hex end of a standard bit or even an Allen key are also considered to be within the scope of the invention.

In operation, joiner 100 is placed on a drill by mounting drive head 142 onto the hex bit. As joiner 100 maintains a perpendicular arrangement to the drill bit the joiner can be reliably placed on the end of the drill and joiner 100 oriented so that semi-circular head 121 of joining element 120 is guided into circular cavity 210. Joining element 110 can be slotted into corresponding circular cavity 310 with this entire operation only requiring the use of one hand. The drill is then activated to retract the shaft 130 of the joiner element 120 so as to shorten the joiner and thereby close the joint whilst the other free hand can be used to ensure that the joint and bench top surface are level. As joiner 100 is recessed in a level orientation within the bench top, joiner 100 advantageously provides a clamping force closer to the bench top surface then that of prior art joiners. Clearly, if the direction of the drill is reversed the above-described mechanism functions in reverse and shaft 130 will protract from housing 112 to thereby lengthen the joiner 100 which can then be easily removed from cavities 210, 310 if desired.

Although a preferred embodiment of the apparatus of the present invention has been described in the foregoing detailed description, it will be understood that the invention is not limited to the embodiment disclosed, but is capable of numerous rearrangements, modifications and substitutions without departing from the scope of the invention as set forth and defined by the following claims.